CVEN 3161-010
Mechanics of Materials I
Fall 2008

- **Instructor:** Kaspar J. Willam; Office: ECOT 456, Tel: 2-7011
- **Office Hrs:** MWF 9:00-10:00am; e-mail: willam@colorado.edu
- **Teaching Assistant:** Mohammadreza Mostafa; TA Office: ECCE 164
  - **Office Hrs:** Wednesday 4:00-6:00pm; e-mail: mohammadreza.mostafa@colorado.edu
- **Lab Assistant:** Volkan Isbuga; ECCE 1B52, e-mail: volkan.isbuga@colorado.edu
- **Lectures:** MWF 8:00-8:50am, ECCR 245
- **Laboratory:** Three lab sessions during semester (plus one lab for mixing concrete):
  - Lab Groups 1-3, L-011: W 1:00-2:00 pm, ECCE 1B52
  - Lab Groups 4-6, L-011: W 2:00-3:00 pm, ECCE 1B52
  - Lab Groups 7-9, L-012: W 3:00-4:00 pm, ECCE 1B52
- **Assignments:** Weekly Homework Problem Sets [10 out-of-11] (20%).
- **Term-Projects:** Three Individual Laboratory Reports (30%).
- **Three Midterm Examinations:** ECCR 245
  - Wednesday 8:00-8:50am: Sept. 24, Oct. 22, Nov. 19, 2008 (30%).
- **Final Examination:** ECCR 245, Wednesday, Dec. 17, 2008, 4:30 -7:00pm (20%).
- **Disabilities:** Students with disabilities who need academic accommodations should discuss options with the instructor during the first two weeks of class.

**Course Outline**

1. **Introduction:** August 25 - 27, 2008
   - Fundamental Concepts of Mechanics of Materials 1.1-1.2
   - Review of Static Equilibrium 1.4

2. **Stress and Strain, Design:** August 29 - September 12, 2008
   - Normal Stress 2.1-2.2
   - Extensional Strain 2.3
   - Normal Stress-Strain Diagrams 2.4
   - Elasticity and Plasticity 2.5
   - Linear Elasticity, Hooke’s Law and Poisson’s Ratio 2.6
   - Shear Stress and Shear Strain 2.7
   - Stresses on an Inclined Plane 2.8
   - Generalized Hooke’s Law (E, ν, G, K) 2.10
   - Allowable Stress Design 2.12
• Axial Deformation of Uniform and Non-Uniform Bars  
• Stiffness and Flexibility of Uniform Bars  
• Serial and Parallel Axial Bar Assemblies (Composite Bars)  

Midterm #1: September 24, 2008

4. Torsion: September 26 - October 8, 2008  
• Elastic Torsion of Circular Bars  
• Serial and Parallel Torsion Bar Assemblies (Composite Torsion Bar)  
• Inelastic Torsion of Circular Bars

• Equilibrium using Free Body Diagrams  
• Differential Equilibrium Relationships  
• Interrelationship of Shear Force and Bending Moment Diagrams

Midterm #2: October 22, 2008

• Kinematics of Bending: Euler-Bernoulli Theory  
• Flexural Stresses in Elastic Beams  
• Allowable Stress Design of Beams, Elastic Section Modulus

Midterm #3: November 19, 2008

7. Deflections of Beams: November 7 - 17, 2008  
• Elastic Moment-Curvature Relation  
• Differential Equations of Beam Deflection  
• Deflection Analysis by Direct Integration  
• Statically Indeterminate Deflection Problems

8. Transformation of Stress and Mohr’s Circle: November 21 - Dec 5, 2008  
• Transformation Relationships of Plane Stress  
• Principal Stresses and Maximum Shear Stress  
• Mohr’s Circle for Plane Stress

9. Stresses due to Combined Loading: December 8 - 12, 2008  
• Thin-Walled Pressure Vessels  
• Stresses in Frame Members due to Combined Loading